



IEM Engineering Impact Survey

Report on

The Transition to New Electrical Wiring Cable Colour Codes under Energy Commission Directive No. 11/2026

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Executive Summary

This report presents findings from the IEM Engineering Impact Survey (18–28 June 2026), which examined industry awareness, readiness, and perceptions regarding Malaysia's transition to the IEC 60445 wiring colour code under Energy Commission Directive No. 11/2026. Responses were gathered from 300 engineering professionals, predominantly electrical engineers and consultants with extensive industry experience; as participation was voluntary, findings should be read as indicative of industry sentiment rather than statistically representative of the profession.

Overall reception is cautiously positive: 64.67% of respondents were aware of the directive, 55% considered the transition period sufficient, and nearly half expressed support, against 19% opposition. However, 67.33% raised safety concerns, centred on the reversal of Black and Blue conductor identification wherever legacy and IEC-compliant wiring coexist. Human error (57.14%) and insufficient training (27.35%) were identified as the leading implementation risks, while industry readiness remains mixed, with only 21.63% of organisations fully prepared.

Respondents called strongly for technical seminars, updated guidelines, and CPD support from IEM. Key recommendations include restricting new colour codes primarily to new installations, adopting permanent labelling, launching a nationwide public awareness campaign, and reinforcing a "test before touch" culture. Success will depend on coordinated enforcement, structured training, and rigorous verification during the transition.

1.0 Introduction

The Institution of Engineers, Malaysia (IEM) conducted an Engineering Impact Survey from 18 June 2026 to 28 June 2026 to assess industry awareness, readiness, and perceptions regarding the implementation of new electrical wiring cable colour codes under Energy Commission Directive No. 11/2026. The directive mandates the transition to the IEC 60445 colour coding standard.

The findings represent the views of the 300 engineering professionals who voluntarily participated in the survey and provide valuable insights into current industry perceptions. As participation was voluntary and respondents were not selected through probability sampling, the results should be interpreted as indicative of industry sentiment rather than statistically representative of the entire engineering profession in Malaysia.

2.0 Background Study: International Adoption of Wiring Cable Colour Codes

The transition to IEC 60445 is part of a global effort to harmonise electrical standards, improve safety, and enhance interoperability across international markets. As global trade, engineering consultancy, and cross-border infrastructure projects continue to expand, a common conductor identification system reduces ambiguity, improves interoperability of electrical equipment, and facilitates the mobility of engineering professionals. Standardised colour coding also simplifies the design, installation, inspection, maintenance, and troubleshooting of electrical systems by ensuring consistency across jurisdictions. While the transition requires industry-wide retraining and updates to existing practices, the long-term benefits include enhanced safety, improved regulatory alignment, greater compatibility with internationally manufactured equipment, and reduced risk of errors arising from differing national colour conventions.

Countries such as the United Kingdom and European Union transitioned from legacy colour codes to IEC-compliant systems in the mid-2000s. During the transition period, both systems coexisted, leading to initial confusion. Mitigation measures included strict labelling, extensive training, and public awareness campaigns, which ultimately resulted in successful adoption.

Australia and New Zealand implemented IEC-aligned systems earlier, emphasising regulatory enforcement, competency certification, and mandatory testing practices. While early challenges included misidentification and human error, long-term safety outcomes improved significantly.

Singapore adopted IEC colour coding with strong regulatory guidance, enforcement, and industry engagement, resulting in a smooth transition.

Common lessons from international experiences include:

- Mixed colour systems during transition periods pose significant safety risks.
- Human error is the primary cause of incidents.
- Effective communication, training, and enforcement are critical.
- Permanent labelling and verification practices reduce risks.

3.0 Malaysian Government Position and Regulatory Perspective

The Energy Commission (Suruhanjaya Tenaga) has introduced Directive No. 11/2026 to align Malaysia's electrical standards with international practices. The transition period from 2026 to 2028 allows industry stakeholders to adapt through updated design practices, retraining, and gradual phase-out of legacy systems.

The transition to the new conductor colour identification system forms part of a broader standards framework governing electrical installations in Malaysia. Energy Commission Directive No. 11/2026 mandates the adoption of the conductor identification principles specified in IEC 60445, which establishes internationally harmonised identification of equipment terminals, conductor terminations, and conductors. The implementation of IEC 60445 complements the requirements of MS 1979, MS 1936 and MS IEC 60364, Malaysia's adoption of the IEC 60364 series for low-voltage electrical installations, which emphasises that conductor colours serve only as a means of identification and must not replace proper verification procedures. Consequently, electricians and engineers should always verify conductor function using appropriate test instruments before commencing any installation, maintenance, or modification work. This principle is particularly critical during the transition period when both legacy and IEC-compliant wiring systems may coexist within the same facility.

The Commission emphasises that compliance will be mandatory for all new installations upon full implementation. It also highlights the importance of proper labelling, documentation, and verification through testing instruments, noting that reliance solely on cable colour identification is not acceptable.

To support implementation, the regulatory framework is expected to be complemented by industry engagement initiatives involving regulators, professional institutions, training providers, contractors, consultants, and other stakeholders. Key areas of focus include technical guidance, awareness programmes, competency development, and compliance monitoring.

The Ministry of Energy Transition and Water Transformation (PETRA) has also highlighted the importance of enhancing electrical safety standards and strengthening industry readiness as part of Malaysia's broader efforts to modernise national infrastructure and regulatory practices.

The successful implementation of the new colour coding system will require close collaboration among regulators, industry practitioners, employers, educational institutions, and professional bodies to ensure that the transition is carried out safely, effectively, and consistently across the country.

4.0 Survey Methodology

The survey was conducted online over a ten-day period and targeted engineering professionals involved in electrical design, installation, supervision, and compliance. A total of 300 valid responses were collected and analysed.

5.0 Respondent Profile

The survey attracted a highly experienced group of respondents.

Electrical engineers formed the majority (59.67%), followed by Mechanical Engineers (16.67%) and Civil Engineers (15.33%). A significant proportion (83.67%) had more than 11 years of experience, with 53.67% having over 20 years. Consultants represented the largest group (46.67%), followed by contractors (22.33%).

Illustration 1: Respondent Distribution by Discipline

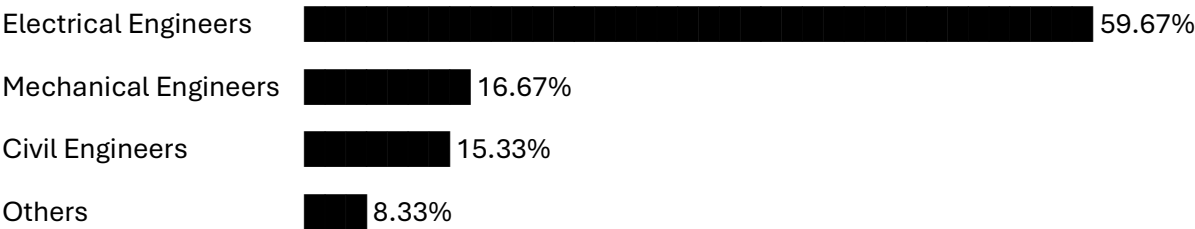
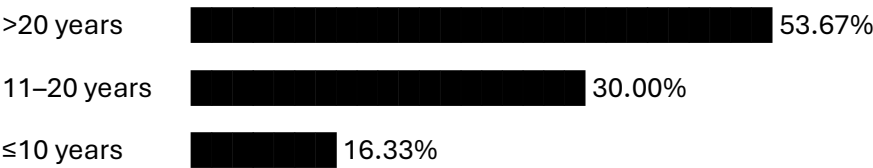


Illustration 2: Years of Experience



6.0 Survey Findings

6.1 Awareness and Acceptance

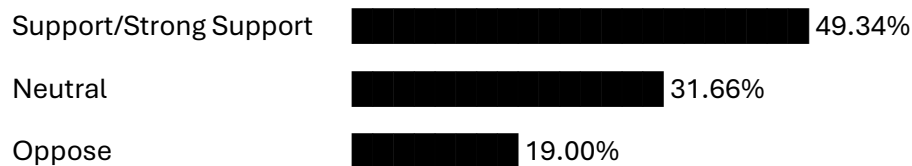
The survey indicates a generally positive reception towards the adoption of IEC 60445.

- 64.67% of respondents were aware of the transition commencement on 1 January 2026.
- 55% considered the three-year transition period sufficient or very sufficient.
- 49.34% expressed support or strong support for the new system.
- 19% opposed the change.

Illustration 3: Awareness of Directive



Illustration 4: Level of Support



6.2 Safety Concerns During Transition

Most respondents (67.33%) expressed concerns about safety risks due to the coexistence of old and new colour codes.

Table below provides a complete list of comparison of the cable colour codes between the existing code and the IEC 60445.

Function	Existing Code	IEC 60445
L1	Red	Brown
L2	Yellow	Black
L3	Blue	Grey
Neutral	Black	Blue
PE	Green/Yellow	Green/Yellow

Of particular concern is the interchange of the Black and Blue conductors, where Black changes from Neutral to Phase, while Blue changes from Phase to Neutral. This reversal presents the greatest safety risk during the transition period, especially in facilities containing a mixture of legacy and IEC-compliant wiring, as personnel familiar with the previous colour convention may incorrectly identify conductors based solely on colour.

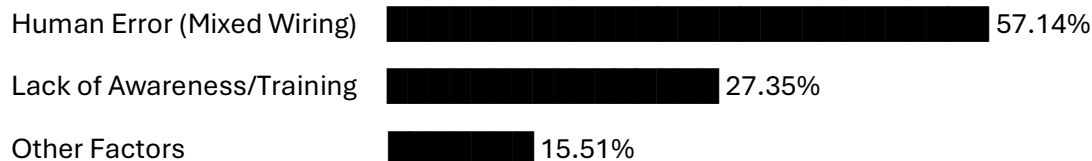
6.3 Implementation Challenges

Perceptions of safety requirement adequacy were mixed:

- 44.08% considered them adequate or very adequate
- 27.76% considered them inadequate
- Average rating: 3.19 out of 5

Human error was identified as the primary challenge (57.14%), followed by lack of awareness and training (27.35%). Experienced electricians often identify conductors using colour recognition developed over decades. The reversal of Blue and Black introduces a significant cognitive risk, particularly during maintenance of partially upgraded installations.

Illustration 6: Key Implementation Challenges



6.4 Industry Readiness

Industry preparedness remains moderate:

- 21.63% fully prepared
- 34.29% partially prepared
- 28.16% not prepared

Average preparedness score: 2.62 out of 4

Illustration 7: Industry Readiness Levels



6.5 Expected Support from IEM

Respondents indicated strong demand for technical and professional support.

Illustration 8: Preferred Support Measures



7.0 Key Recommendations

Based on survey responses, the following recommendations are proposed:

7.1 Separation of Installations

Apply new colour codes primarily to new installations to minimise risks associated with mixed systems. Many suggest applying the new code only to greenfield (new) projects to avoid the dangers of mixed wiring within a single facility.

7.2 Permanent Identification Measures

Implement durable labelling and signage using long-lasting materials such as engraved or metal plates.

7.3 Public Awareness Programme

Extend awareness initiatives to electricians, contractors, facility managers, building owners, and the public. The respondents felt a nationwide campaign is needed to reach domestic users and small-scale contractors who operate outside formal engineering circles.

7.4 Strengthening Testing Practices

Promote a “test before touch” culture to ensure safety regardless of cable colour. Some respondents stressed that testing must supersede colour recognition, urging a culture where “testing before touching” is mandatory.

8.0 Conclusion

The survey demonstrates broad support for the transition to IEC 60445 and alignment with international standards. However, significant safety concerns remain, particularly during the transition period involving mixed installations.

Successful implementation will depend on strong regulatory enforcement, comprehensive training, effective communication, and strict adherence to verification practices.

The Institution of Engineers, Malaysia (IEM), in collaboration with the Energy Commission and relevant government agencies, is well-positioned to support the industry through technical guidance, training programmes, stakeholder engagement, and public awareness initiatives to ensure a safe and effective transition.

